

I n s i d e		August 13, 2004 Volume 34 Number 16	
News Briefs . . . . .	2	Moonrise sample return . . . . .	3
Special Events Calendar . . . . .	2	Letters . . . . .	4
Spirit data online . . . . .	3	Classifieds . . . . .	4

## Cassini uncovers new radiation belt

By Carolina Martinez

*This artist's concept shows  
how Cassini is able to  
detect radio signals from  
lightning on Saturn.*

**The Cassini spacecraft,  
which began its tour of the  
Saturn system just over a month  
ago, has detected lightning and  
a new radiation belt at Saturn.**

The spacecraft's radio and plasma wave science instrument detected radio waves generated by lightning. "We are detecting the same crackle and pop one hears when listening to an AM radio broadcast during a thunderstorm," said Dr. Bill Kurth, deputy principal investigator on the radio and plasma wave instrument, University of Iowa, Iowa City. "These storms are dramatically different than those observed 20 years ago."

Cassini finds radio bursts from this lightning are highly episodic. There are large variations in the occurrence of lightning from day to day, sometimes with little or no lightning, suggesting a number of different, possibly short-lived storms at middle to high latitudes. Voyager observed lightning from an extended storm system at low latitudes, which lasted for months and appeared highly regular from one day to the next.

The difference in storm characteristics may be related to very different shadowing conditions in the 1980s than are found now. During the Voyager time period when lightning was first observed, the ring cast a very deep shadow near Saturn's equator. As a result, the atmosphere in a narrow band was permanently in shadow — making it cold — and located right next to the hottest area in Saturn's

atmosphere. Turbulence between the hot and cold regions could have led to long-lived storms. However, during Cassini's approach and entry into Saturn's orbit, it is summer in the southern hemisphere and the ring shadow is distributed widely over a large portion of the northern hemisphere, so the hottest and coldest regions are far apart.

A major finding of the magnetospheric imaging instrument is the discovery of a new radiation belt just above Saturn's cloud tops, up to the inner edge of the D-ring. This is the first time that a new Saturnian radiation belt has been discovered with remote sensing.

This new radiation belt extends around the planet. It was detected by the emission

of fast neutral atoms created as its magnetically trapped ions interact with gas clouds located planetward of the D-ring, the innermost of Saturn's rings. With this discovery, the radiation belts are shown to extend far closer to the planet than previously known.

"This new radiation belt had eluded detection by any of the spacecraft that previously visited Saturn. With its discovery we have seen something that we did not expect, that radiation belt particles can 'hop' over obstructions like Saturn's rings, without being absorbed by the rings in the process," said Dr. Donald G. Mitchell, instrument scientist for the magnetospheric imaging instrument at the Johns Hopkins University Applied Physics Laboratory, Laurel, Md.

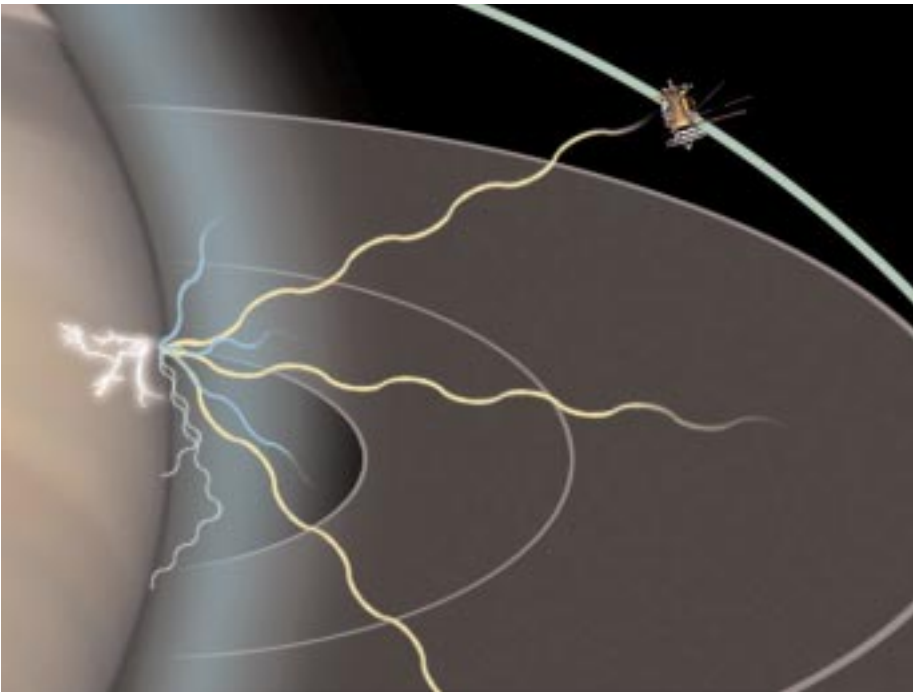


Photo credit: NASA/JPL/University of Iowa

## Dying star goes out with a ring

By Whitney Clavin

**Nearly one year since its launch, the  
Spitzer Space Telescope is busy capturing  
intriguing views of the cosmos.**

In this new picture, the observatory has revealed a never-before-seen ring of material amidst the shimmering embers of a dying star. "Spitzer's infrared vision has revealed what could not be seen before — a massive ring of material that was expelled from the



dying star," said Dr. Joseph Hora, a Spitzer scientist at the Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass. "The composition of the ring and how it formed are mysteries we hope to address with further Spitzer studies."

The dying star is part of a "planetary nebula" called NGC 246. When a star like our own Sun begins to run out of fuel, its core shrinks and heats up, boiling off the star's outer layers. Leftover material shoots outward, expanding in shells around the star. This ejected material is then bombarded with ultraviolet light from the central star's fiery surface, producing huge, glowing clouds — planetary nebulas — that look like giant jellyfish in space.

NGC 246 is located 1,800 light-years away in the Cetus constellation of our galaxy. Previous observations of this object by visible-light telescopes showed a glistening orb of gas and dust surrounding a central, compact star.

By cutting through the envelope of dust with its infrared eyes, Spitzer provides a more transparent view through and behind the nebula. "What we have seen with Spitzer is totally unexpected — a ring component that may consist of hydrogen molecules."

Ultimately, these data will help astronomers better understand how planetary nebulas take shape, and how they nourish new generations of stars. A scientific paper on this and other planetary nebulas observed by Spitzer will be published on Sept. 1 in The Astrophysical Journal Supplement, along with 75 other papers reporting Spitzer early mission results.

Spitzer was launched on August 25, 2003, from Cape Canaveral Air Force Station, Florida. Additional images and information about the Spitzer Space Telescope are available at <http://www.spitzer.caltech.edu>.

# News Briefs

## JPL Origins proposal selected

NASA has selected nine studies, including one from JPL, to investigate new ideas for future mission concepts within its Astronomical Search for Origins Program.

Some of the new mission ideas will survey 1 billion stars within our own galaxy; measure the distribution of galaxies in the distant universe; study dust and gas between galaxies; study organic compounds in space and investigate their role in planetary system formation; and create an optical-ultraviolet telescope to replace NASA's Hubble Space Telescope.

The products from these concept studies will be used for future planning of missions complementing the existing suite of operating missions, including the Hubble and Spitzer Space Telescopes, and developmental missions such as the James Webb Space Telescope and Terrestrial Planet Finder.

Each of the selected studies will have eight months to further develop and refine concepts for missions addressing different aspects of Origins Program science. The Origins Program seeks to address the fundamental questions "Where did we come from?" and "Are we alone?" NASA received 26 proposals in response to this call for mission concepts.

JPL's Matt Bradford is the principal investigator of "A Background Limited Infrared-Submillimeter Spectrograph for Spica: Revealing the Nature of the Far-Infrared Universe." The study will enable far-infrared spectroscopy of the galaxies that make up the far-infrared background out to distances of some of the farthest galaxies known today. Its spectral surveys will chart the history of creation of elements heavier than helium and energy production through cosmic time. Spica is a Japanese mission.

## Transformation Dialogue at JPL

The next Transformation Dialogue will be held Aug. 20 at 12:30 p.m. It will be broadcast live on NASA TV, from JPL and will feature Dr. Charles Elachi, JPL Director, and Director of Advanced Planning at NASA Headquarters, and Kevin Petersen, Dryden Flight Research Center Director. Johnny Stephenson, the One NASA Implementation Team Lead from NASA Headquarters will moderate. The Dialogue topic will be "Competition vs. Collaboration: When Should NASA Centers Compete and When Should They Collaborate?"

To participate in a NASA-wide, online dialogue already underway, visit the "NASA Transformation" section of the Inside NASA website at <http://insidenasa.nasa.gov>. To submit a question to be addressed during the broadcast, e-mail it to [transformation@nasa.gov](mailto:transformation@nasa.gov) before or during the show.

If you would like to be part of the live audience, contact Andrea Vanacore at 4-3359. Space is limited.

## Trajectory maneuver brings Genesis closer to home

Thirty days before its historic return to Earth with NASA's first samples from space since the Apollo missions, the Genesis spacecraft successfully completed its twentieth trajectory maneuver.

At 12:00 Universal Time (5:00 a.m. PDT), Mon., August 9, Genesis fired its 90-gram (0.2 pound) thrusters for a grand total of 50 minutes, changing the solar sampler's speed by 1.4 meters per second (about 3.1 miles per hour). The maneuver required half a kilogram (1.1 pounds) of hydrazine monopropellant to complete.

"It was a textbook maneuver," said Ed Hirst, Genesis's mission manager at JPL, Pasadena, Calif. "After sifting through all the post-burn data, I expect we will find ourselves right on the money."

The Genesis mission was launched in August 2001 on a journey to capture samples from the storehouse of 99 percent of all the material in our solar system — the Sun. The samples of solar wind particles, collected on ultra-pure wafers of gold, sapphire, silicon and diamond, will be returned for analysis by Earth-bound scientists. The samples Genesis provides will supply scientists with vital information on the composition of the Sun, and will shed light on the origins of our solar system.

## Relays from Mars show international interplanetary networking

One of NASA's Mars rovers has sent pictures relayed by the European Space Agency's Mars Express orbiter for the first time, demonstrating that the orbiter could serve as a communications link if needed.

The link-up was part of a set of interplanetary networking demonstrations paving the way for future Mars missions to rely on these networking capabilities. The American and European agencies planned them as part of continuing efforts to cooperate in space exploration.

On Aug. 4, as Mars Express flew over NASA's Mars Exploration Rover Opportunity, the orbiter received data previously collected and stored by the rover. The data, including 15 images from the rover's nine cameras, were subsequently forwarded to the European Space Operations Centre, Darmstadt, Germany, and immediately relayed to the rover team based at JPL.

Mars Express also is demonstrating two other networking modes with Opportunity and the twin rover, Spirit, between Aug. 3 and Aug. 13. Two NASA orbiters, Mars Odyssey and Mars Global Surveyor, have relayed most of the data the rovers have produced since they landed in January.

# Special Events Calendar

## Ongoing Support Groups

Alcoholics Anonymous—Meetings are available. Call the Employee Assistance Program at ext. 4-3680 for time and location.

Caregivers Support Group—Meets the first Thursday of the month at noon in Building 167-111 (the Wellness Place). For more information, call the Employee Assistance Program at ext. 4-3680.

Codependents Anonymous—Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Group—Meets the first Friday and third Thursday of the month at noon in Building 111-117. Call the Employee Assistance Program at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Parents Group for Children With Special Needs—Meets the second Thursday of the month at noon in Building 167-111 (the Wellness Place).

Working Parents Support Group—Meets the third Thursday of the month at noon in Building 167-111. For more information, call the Employee Assistance Program at ext. 4-3680.

## Tues.-Wed., Aug. 17-18

Blood Drive: A pint for a pint—Held in von Kármán Auditorium from 10 a.m. to 4 p.m. Tuesday and from 7 a.m. to 1:00 p.m. Wednesday. All participants will receive a coupon for a pint of Baskin Robbins ice cream. Advance sign up sheets are available at JPL Occupational Health Services, Building 310-202, prior to the blood drive, or sign up online at <http://www.givelife.org/index.cfm?hcl=JPL>, enter your e-mail and birthdate. "JPL" is the sponsor code. For last-minute sign ups, or to change your appointment, call the Red Cross at (626) 960-6956 x225.

## Tuesday, August 17

JPL Hiking Club—Retired Pomona College professor Bob Herman will discuss historical buildings in downtown Los Angeles at noon in Building 238-543.

## Wednesday, August 18

TIAA/CREF Enrollment Meeting—This workshop at noon in T1720-137 is designed to assist employees newly eligible for the Caltech/JPL retirement plan with investment options and the completion of their enrollment forms.

## Thursday, August 19th

Claremont Graduate University/The Peter F. Drucker and Masatoshi Ito Graduate School of Management open house—from 3:30 to 5 p.m. in the

180-101 conference room. Certificates are available in General Management, Leadership and Strategy. There are also EMBA (Executive Master of Business Administration) and MSAM (Master of Science in Advanced Management) programs available. Certificate courses may be offered on Lab during the early evenings depending on demand. For more information, call Professional Development at 4-3750.

## Thu.-Fri., August 19-20

Von Kármán Lecture Series—Orbiting Carbon Observatory deputy principal investigator Charles Miller will present "Understanding Atmospheric CO<sub>2</sub> and Its Impact on Climate Change" at 7 p.m. Thursday in von Kármán Auditorium and Friday in Pasadena City College's Vosloh Forum, 1570 E. Colorado Blvd. Thursday's lecture will be webcast at <http://www.jpl.nasa.gov/events/lectures/aug04.cfm>. For more information, call Public Services at ext. 4-0112.

## Friday, August 20

Investment Advice—Fidelity will offer one-on-one counseling. For an appointment, call (800) 642-7131.

## Saturday, August 21

Caltech/JPL Day at Dodger Stadium—The festivities start at 11 a.m. with a carnival for all the family, followed by the game between the Dodgers and the Atlanta Braves at 1:10 p.m. Tickets are \$4 and are on sale at the JPL Store, the credit union in Building 218 and the credit union branch in La Cañada.

## Tuesday, August 24

Noon-1:00 p.m., Section 367 will present "A Word Is Worth A Thousand Pixels: Data Mining in Large Collections of Science Images," featuring Dominic Mazzoni of the Exploration Systems Autonomy Section, in the 167 Conference Room. Mazzoni will discuss two specific approaches to image data mining that his group has used successfully in several different science domains.



## Wednesday, August 25

JPL Toastmasters Club—Meeting at 5 p.m. in the 167 conference room. Call Dirk Rounge at ext. 3-0465 for information.

Volunteer Professionals for Medical Advancement—Meeting at 10:30 a.m. at the Caltech Credit Union, 528 Foothill Blvd., La Cañada.

# How much is that doggie in the window?...



AiBee, an interactive robot art project, performed in the Mall July 30. The robotic dog interacts with people bringing origami flowers into its hive tent.

As a member of the NASA Faculty Fellowship Program, Professor Sheila Tejada from the University of New Orleans has been collaborating this summer with Dr. Ayanna Howard in the Tele-Autonomous Research group on robot construction workers

for building habitats on the Moon and Mars.

AiBee employs the Virtual Synergy Interface developed by Tejada. Virtual Synergy combines a three-dimensional graphical interface with robots to allow for collaboration among several people, simulated software agents and robots.

For more information on the Aibee project, visit <http://www.aibee.org/>.



This self-portrait of NASA's Mars Exploration Rover Opportunity comes courtesy of the Sun and the rover's front hazard-avoidance camera. The dramatic snapshot of Opportunity's shadow was taken as the rover continues to move farther into "Endurance Crater." The image was taken on sol 180 (July 26, 2004), a date that marks achievement of fully double the rover's primary 90-sol mission.

# Spirit data now online

Millions of people have viewed pictures from NASA's Spirit on the Mars rovers' home page and other Internet sites. A more complete set of science data from Spirit's first 30 martian days is now posted on a site primarily for scientists and technical researchers, but also available to anyone who's interested.

The first installment of images, spectroscopic measurements, daily reports and other information from NASA's Mars Exploration Rover mission has been posted on NASA's Planetary Data System site. It is available with a new "Analyst's Notebook" user interface at <http://pds-geosciences.wustl.edu/meran>. Home page for the Planetary Data System is <http://pds.jpl.nasa.gov>. Images are also available from the system's Planetary Image Atlas, at [http://pdsimg.jpl.nasa.gov/cgi-bin/MER/search?INSTRUMENT\\_HOST\\_NAME=MARS\\_EXPLORATION\\_ROVER](http://pdsimg.jpl.nasa.gov/cgi-bin/MER/search?INSTRUMENT_HOST_NAME=MARS_EXPLORATION_ROVER).

Data from Opportunity's first 30 martian days, or "sols," will be added Aug. 24, and data from later portions of both rovers' missions will be added in October.

"All the raw images and selected processed images and other information have been shared with the public since the rovers first reached Mars in January. This release adds other derived images and maps used for planning, all the non-image data from the spectrometers, daily operational reports and activity plans," said Dr. Ray Arvidson of Washington University, St. Louis, deputy principal investigator for the twin rovers' science payload.

"The 'Analyst's Notebook' is designed to help you navigate through the data and understand the synergies," he said. "You can't deal with the Moessbauer spectrometer readings from a given sol without information about other observations that go with it."

"We are proud to be releasing such a comprehensive set of data from the surface science mission of the twin rovers so quickly," said Dr. Jim Garvin, NASA's chief scientist for Mars. "It's a testament to the dedication and commitment of the science and engineering teams that this remarkable collection of information is now available to the entire world for interpretation, education and to help guide NASA's new exploration focus," added Garvin.

Images and additional information about the project are available from JPL at <http://marsrovers.jpl.nasa.gov> and from Cornell University, at <http://athena.cornell.edu>. The Planetary Photojournal, at <http://photojournal.jpl.nasa.gov>, is another resource for easy public access to images of Mars and other worlds.

# Moonrise proposes to return lunar samples for NASA's New Frontiers Program

In the July 30 issue, Universe profiled "Juno," one of two proposed missions selected by NASA earlier last month for detailed study in the agency's New Frontiers Program. The other proposal chosen by NASA as a New Frontiers candidate is "Moonrise: Lunar South Pole-Aitken Basin Sample Return Mission." This investigation proposes to land on the far side of the moon, inside a large basin, and to return two kilograms (about five pounds) of lunar materials from a region of the moon's surface believed to harbor materials from the moon's mantle.

The proposal teams Dr. Michael Duke of the Colorado School of Mines, principal investigator with JPL and Lockheed Martin, and a science team that resembles a who's who listing of experts in the field of planetary science and sample analysis. The project scientist at JPL is Dimitri Papanastassiou (Section 3264).

The proposed mission would have many firsts — "Moonrise" would be the first US planetary surface robotic sample return; it would be the first mission to return a sample from the surface of the moon in more than 35 years and the first time that JPL will have a significant role in flight system development for a competed mission.

The primary scientific goal of Moonrise is to investigate the evolution of the solar system, through the fate of large impactors in the inner solar system, in the first half billion years of solar system history. Dating of returned Apollo and Luna samples has long indicated a concentration in time of large basin formation by impacts at about 4 billion years ago, for the basins on the front, Earth-facing side, of the moon. Competing theories suggest that the observations were either due to a large, late spike in the frequency of impacts on the moon, and also the early Earth, dubbed the Lunar Cataclysm. Or, alternatively, the data represent the tail-end of the impact history, with many of the impacts on the moon prior to 4 billion years having been obscured by the events around 4 billion years ago. Earth must have also

been subject to the same type of impacts, but the surface of Earth is active and this evidence has not been preserved. The fate of impactors is important to understand the evolution of the inner solar system and may be related to the emergence of life on Earth, more recently than 4 billion years ago. As the largest and oldest basin on the moon, the South Pole-Aitken Basin can serve as a starting point to understand lunar impact history between the time of its formation and the age of the near-side basins.

"The moon contains a unique record of the external environment within which the Earth's surface took shape in the period when life was just starting. The moon has been and will continue to be the scientific cornerstone for our understanding of the early evolution of the terrestrial planets," said Dimitri Papanastassiou, senior research scientist and JPL project scientist for the mission.

Sample analysis is the only way in which the composition and age of mixed rock fragments in the lunar regolith can be precisely determined and is therefore critical to science objectives of the Moonrise mission. Moonrise will return samples for analysis in laboratories on Earth, where the expertise of the science team and the full diversity of techniques available can yield valuable science data.

Speaking about the selection of the Moonrise and Juno missions, Dr. Ed Weiler, NASA's associate administrator for space science, said "These two outstanding proposals were judged to be the best science value among the seven submitted to NASA in 2004. It was a very tough decision, but we're excited at the prospect of the discoveries either of



them could make in continuing our mission of exploration of the solar system, and what they could tell us about our place in the universe."

Each proposal will now receive up to \$1.2 million to conduct a seven-month implementation feasibility study focused on cost, management and technical plans, including educational outreach and small business involvement.

Following detailed mission concept studies by Moonrise and Juno, due for submission by March 2005, NASA intends to select one of the mission proposals for full development as the second New Frontiers mission by May 2005. The selected New Frontiers science mission must be ready for launch no later than June 30, 2010, within a mission cost cap of \$700 million.

The two selected proposals were submitted to NASA in February 2004, in response to the New Frontiers Program 2003 and Missions of Opportunity Announcement of Opportunity. The New Frontiers Program is designed to provide opportunities to conduct several of the medium-class missions identified as the top priority objectives in the Decadal Solar System Exploration Survey, conducted by the Space Studies Board of the National Research Council.



View this and previous issues of Universe at

<http://universe.jpl.nasa.gov>

E-mail us at

[universe@jpl.nasa.gov](mailto:universe@jpl.nasa.gov)

Editor

Mark Whalen

Design + Layout

Adriane Jacob, Audrey Steffan/  
Design Services

Chief Photographer

Bob Brown/Photo Lab

Advertising

Susan Braunheim-Kalogerakos

Universe is published every other Friday by the Office of Communications and Education of the Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109.

Notice to Advertisers

Advertising is available for JPL and Caltech employees, contractors and retirees and their families. No more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submission. Ads must be submitted via e-mail to [universe@jpl.nasa.gov](mailto:universe@jpl.nasa.gov) and are due at 2 p.m. on the Monday after publication for the following issue.

All housing and vehicle advertisements require that the qualifying person(s) placing the ad be listed as an owner on the ownership documents.

Letters

Sincere thanks to my friends and co-workers for their support and their words of concern and sympathy during the illness and recent death of my father. My family and I appreciate your thoughtfulness. Thanks also to JPL for the beautiful plant that was sent to my home.

Julie Cooper and family

On behalf of the Ferren family, I would like to thank my co-workers and colleagues in Div. 27, and the many friends here at JPL for their kind words, thoughts and condolences on the recent passing of my mother. To the entire JPL community, thank you. Through the many years my family has been associated with JPL, your astonishing achievements never ceased to amaze her. Thanks also to JPL for the beautiful plant.

Dennis Ferren

I would like to thank my friends and co-workers for their kind words of support and sympathy on the passing of my mother. Thank you also to JPL for the beautiful plant.

Robyn Lefler

Classifieds

For Sale

AUDIO RECEIVER, Onkyo, TX-SV919thx, home theater, 110 w/ch rms @ 8 ohms, \$200. 626/305-6166.

BAR STOOLS, new, mesquite & brown leather, 30" H, \$250 pr. 653-9561, Sue.

BICYCLE, tandem, Schwinn, 5 speed, red, gd. cond. (some rust), saddle bags and pump, \$150. 248-8619, Tom Farr.

CAMERA, digital, Olympus Camedia 2040ZOOM, 3x optical zoom, 2 megapix, very bright, large lens, fantastic pictures, 128 MB card, exc. cond., \$189/obo; DVD RECORDER, Panasonic, DMR-E50P, DVD-R/RW/DVD-RAM, exc. recording quality, up to 6 hr./DVD, <1yr. old, time slip, remote, exc. cond., \$199/obo. 909/592-2279.

CARPET nearly-new, light-mauve, high-quality, 1 piece about 16 x 17, 1 piece about 12 x 11, \$125 & \$80. 626/794-1432.

CARTRIDGE, for Brother fax machine, model PC-102RF, brand new, \$20; DIET TAPES, Jenny Craig, set of 14, \$25; CONTROL CENTER, computer power, 5 power switches + 1 master switch, 5 surge-protected outlets + 2 modem/fax/phone jacks, new, \$20; CARD SHUFFLER, Johnson, collectible item, all-metal construction with carved-wood dowel handles, stands ~6" handle-high, and ~9" by 6", \$35. 790-3899.

CLOTHES, infant: jacket, red/navy blue, zip-up w/hood (old navy), size 2T, exc. cond., \$5/obo; sweater, sky blue w/navy trim, buttons, size 3T, \$1/obo; zipper shoes, Spongebob motif, size 11M, exc. cond., \$6/obo; photos available. 626/791-6101.

COMPUTER, Dell Dimension 4100, desktop, P3 933MHz, 8G HDD, no bad sector, 384M RAM, Sony 15" CRT/usb/lan/modem/sound/vga, mouse/keyboard/all orig. Dell CDs, manuals, boxes, perfect working order, VG cond., sell due to upgrade, \$120/obo. 626/304-9249.

COMPUTER, Pentium, 300 MHz, 128 MB RAM, 3 G byte HD, Win. 98, \$100/obo; monitor, Radius, \$75; speakers, Cambridge, \$10; keyboard & mouse, \$5; everything, \$175. 626/282- 8515.

COMPUTER DESK, on wheels, cherry veneer, made by O'Sullivan, model 61925, exc. cond., like new, best offer. 626/449-0997.

DINING ROOM SET, Spanish revival, table and 8 high-back hairs, exc. cond., \$1,200. 626/799-3087 or 626/644-2889.

DINING TABLE, smoked glass top, 72" x 42" W, 6 upholstered fabric chairs, exc. cond., \$149/obo. 909/592-2279.

DINNER JACKET, men's, formal, 42 long, burgundy color, tuxedo quality, like new, \$25 (\$125 value). 626/793-1895, Albert.

DODGER TICKETS, selected games from season ticket package, Loge level (orange), Aisle 132 (at first base), two tickets per game at face value of \$30 per ticket, see [www.delunac.net/tickets](http://www.delunac.net/tickets). 626/296-1253 for details and available games.

DODGER TICKETS, up to 4 seats in Loge 164, row J, from my season ticket package, available for most remaining games, \$14 ea. 542-9828 or kimandgene@earthlink.net.

DRYER, apartment size, clothes, \$70. 626/794-1432.

FURNITURE, antique: dresser, pine and enamel, 4 drawers, 34" W x 39" H, \$75; secretary's desk, fold-down front, 26" W, painted, \$30; rocking chair, oak, \$75; desk shelf, not-so-antique, oak, 48" W, \$20; three shelves, hanging set, \$20; all in exc. cond. 626/584-6518.

BEDROOM SET, queen headboard, oak, traditional style, gd. cond., \$375. 626/359-7666.

HITCH, Equal-i-ler sway control, complete

system, the best sway control hitch available, exc. cond., \$160. 626/359-7666.

ICEBOX, antique, oak, exc. cond., made around 1915, 44" H x 32" W x 18" D, \$600. 352-4033, after 5 p.m..

LUMBER, white oak FAS, 4/4, \$3 bd. ft; Cherry \$5; also 1C and thickness to 16/4. 626/798-5110.

MATRESS, box springs and heavy frame, Cal. king, Simmons Beautyrest, Dresden-Firm, new 4/02, used 1-1/2 years, perfect cond., paid over \$1,100 on sale, sell for \$390. 805/955-0331.

MISC: bed pillows, 2, non-allergenic, full size, new, \$5 ea.; blanket, pink, new, full size, \$7; sleeping bag, adult roll-up, inside like new, \$10. 626/793-1895.

MISC: bicycles, 3, 10-speed, \$50/obo ea; toaster ovens, 4, \$6 ea; convection oven, Farberware, \$45; floor lamp, Xenon, 6', black, \$20. 626/282-5815.

MISC: 8' pool table, \$500; table cloths, punch bowl set, 18 piece, \$10; mailbox, oversized, green, \$10; wig, red, shoulder length, never used, \$20; electric frying pan, \$10; answering machine, \$5; portable basketball set (needs net) \$200; fishing pole (saltwater), \$25; bunk bed \$50. 626/357-8210.

MISC: exercise benches, 2, flat, \$50; incline bench, \$50; dumbbells, free while they last; microwave, Sharp Carousel, \$50; aluminum fry pans, 12" and 14", non-stick, restaurant quality, \$15 ea.; bike, woman's, Trek 700, \$150; ski rack, used once \$25; ski boots, men's, used once, \$25, all in exc. cond., 626/449-6799, Bob.

MISC: refrigerator, Sanyo 4.5, like new, less than 1 yr. old, perfect for home and office, \$100; printers, 3, new with manuals, great for high school & college; 2 computers, 1 laptop, all hardly used, gd. cond., see to appreciate, prices negotiable. 626/398-5761.

ORGAN, Yamaha 415 electronic console w/13 pedals, 3 keyboards, 144 rhythm patterns, pd. \$7,500, sacrifice \$2,000; PORT REPLICATOR, for IBM Thinkpad, works with T20, T21, A20, A21, or X, R series, like new, \$85; ULTRA ATA CONTROLLER CARD with cable, fits into 32-bit PCI 2.1 or 2.2 expansion slot on motherboard, brand new, \$20. 790-3899.

PIANO, Yamaha, digital, Clavinova CLP150C, cherry, superb cond., w/bench, manuals (3 languages), music book, CD, headphones, adaptor, buyer arranges pick-up in Glendale, \$1,700. 545-1114, Yumi.

PICNIC TABLE, 54" dia., round, varnished redwood w/4 curved benches & 4 side tables, umbrella, base, exc. cond., \$50. 626/584-6518.

REFRIGERATOR, Kirkland by Whirlpool, 18 cu. ft., white, top freezer, great for apartment or garage, 9 mos. old, must sell, moving, \$300. 731-8791.

SCUBA EQUIPMENT, masks, flippers, wetsuits, drysuits, BCs, etc., 3 different sizes. 626/447-4734.

SCULPTURES, wizards, 3, ceramic, exc. cond., not antiques but unique, only 200 of each in the world, each is different, holds a small clear ball in hand, has beard, about 10" H; if you're into Lord Of The Rings, these are for you, \$100/ea. 352-4033, after 5 p.m.

SOFA, sectional, 2-piece, Bassett (1 piece is a sleeper), floral print, photo & dimensions available, cushions need new covers, rest in gd. cond., \$300/obo. 626/791-6101.

SOFA grouping, light beige color, exc. cond., \$375. 626/305-6166.

SOFA, hide-a-bed, 6 ft., \$25/obo; arm chair, maple, \$10/obo, both in gd. cond. 249-3602.

THEATER TICKETS, 2, Little Shop of Horrors, Ahmanson Theatre, Aug. 26, 8 p.m., seats in mezzanine, orig. \$140 + fees for pair, sell \$100. 790-8523.

TOASTING FLUTES, Marvin & Mrs. Martian, wedding, new, beautiful, pewter and hand-blown glass, designed by Seagull Pewter exclusively for Warner Bros. Studio stores, edition of only 1,000 sets, comes w/certificate of authenticity, orig. \$145+, yours for only \$30. 468-2421.

TROPICAL FLOWERS, plumerias, variety of colors and sizes; shell gingers. 626/444-6156, Annie or Bob.

WADING POOL, Little Tykes, blue, hard plastic, outer dia. 5', water area 4' dia. & 1' D if filled to brim, small integral slide, drain plug, sell for \$30. 626/303-1927.

WASHER, Whirlpool; DRYER, GE, gas; left from previous home owner, gd. cond., \$150/ea. 626/241-7084, Steve.

Vehicles / Accessories

'98 BMW 323, 85K mi., blk., auto, 2 dr., 1thr., sunroof, new brake pads and rear rotors, new rear tires, great cond., \$10.9K. 310/614-5076.

'95 BUICK LeSabre, loaded, leather seats, 130K mi., runs great, \$2,600. 626/447-6423.

'00 CHEVROLET Tahoe, 4.8L, V8, exc. cond., 65K mi., auto., CD/tape/am/fm, running boards, lift guard, a/c, power steering, tint windows, \$24,999/obo.

'94 FORD Aerostar, extended minivan, 7-pass., very lg. storage area, white exterior, blue interior, great cond., 167K mi., loaded, new tires/brakes/water pump & hoses, \$2,500, firm. 626/303-2808, eve.

'93 FORD Explorer XLT, 4-dr., 4 x 4, V6, all power, leather, running boards, towing pkg., roof rack, dark green/grey int., runs great, clean, 140K mi., \$3,000. 626/355-2473.

'99 GMC Yukon Denali, 76K, loaded, 4WD, leather, 6-CD changer, exc. cond., \$16,000/obo. 800/937-9200, Levi or Cathy.

'93 HONDA Accord EX, 4-dr., leather, power moon roof, 174K, gd. cond., \$2,500. 956-0602.

'81 HONDA Civic wagon, auto., runs well, gd. transportation, \$1,000. 626/791-0486, David.

'87 MERCEDES BENZ 300E, exc. cond., rebuilt trans., new ac/tires/battery/struts/injectors/muffler/etc., family car, 120K, sacrifice \$3,500. 626/484-9257.

'89 MERCEDES BENZ 260E, 4-door, gold, 147K orig. mi., garage kept, interior perfect, looks and runs great, new tires, brakes, \$4,500. 626/794-6860.

'83 MERCEDES 300TD, 4 dr., auto., turbo, diesel, 5-cyl., only 115K mi., dark blue, "Blueberry " is her name, all leather w/mahogany wood grain, beautiful body & interior, power everything, works great. 404-2202 or tarro@charter.net.

'94 MERCURY Sable, 3.8L, 67K, smog, auto, 4-spd., a/c, cruise, 4-ABS, 2 air, am/fm/tape, leather, power windows/mirrors/seats, remote lock, very clean in/out, \$2,850/obo. 626/584-0410.

'93 MERCURY Sable GS, wagon, 4 dr., V6, 3.8L, silver, second owner, good records, regular maint., 120K, asking \$1,800. 626/795-3329.

'02 TOYOTA Camry LE, V6, loaded, silver, 37K mi., \$12,950. 360-6364.

'02 VOLVO V4 wagon, only 14K mi., 4-cyl., 1.9L turbo, exc. cond., silver, a/c, stereo/cass./CD, dash cover, garage parked, all service records avail., 15K mi. service completed, new rear brakes, both dealer and extra VIP extended warranty (original \$1,530) transferable, \$16,790. 626/355-5631, Tim.

Free

CLEAN FILL DIRT, 23 cu. yards, you haul as little or as much as you like, near Los Robles/Jackson, Pas. 626/ 791-3103.

CORNER CABINET, wood 30" W x 7" H, 4 open top shelves, bottom cabinet w/2 shelves, 14" D (max); DOOR, 36" W x 79" H, 4 glass panels (frame is solid wood) taken out of a vintage home. 626/794-0455.

CARPET REMNANT, off-white, approx. 15' x 30", gd. cond. w/thick padding, must pick up in Monterey Park. 626/272-2341 or 626/571-2561, Dennis.

JACKETS, size 18, hardly worn: pink, (Sag Harbor), navy, (Radcliffe), soft floral on beige background, (Radcliffe), all 3 jackets have roll-up sleeves. 626/449-0997.

MISC: grape-stake fence boards, cedar, several hundred, mostly 5' L; work bench, lg., wooden, commercially fabricated, 3 drawers, electrical hook-ups, 35" D x 66" W x 32" H, top shelf 17" D x 66" W; planer, Craftsman, mounted on stand w/wheels, very old, electric, for wood; air-compressor, commercial, gas engine, street tire mounted (trailer), old, lg. 626/794-0455.

Lost & Found

FOUND: around the time of the Cassini SOI, interesting brooch/lapel pin, 301-127 conf. rm., call to identify. 3-9076, Carol.

Wanted

BOOKS, used or new, paper or hardback, or magazine, romance, science-fiction, mystery, etc. 248-0178, [engineerbob4449@yahoo.com](mailto:engineerbob4449@yahoo.com).

CARPOOLERS, from La Verne area, 7 a.m. to 3:45 p.m. work hours. Ext. 3-2555, Dawn.

HOUSE or condo for mature JPL couple with dog and two cats, need to move in Sept., prefer yard and garage, \$2,000 max. 235-4015, Steve Slaten.

HOUSE, apt., guesthouse, townhouse, or condo to rent or lease, in Pasadena vicinity, 2 bd., 1 ba., willing to move in now or in a couple of months, \$1500 max. 909/964-3998, Alex.

MEMORABILIA, Friends TV show, poster, T-shirt, cap, key-chain, mouse pad, etc. 909/263-5271, Shu.

RENTAL in La Cañada for quiet family of 4, father is engineer at JPL. 889-2419.

SPACE INFORMATION/memorabilia from U.S. & other countries, past & present, for personal use. 790-8523, Marc Rayman.

UTILITY TRAILER, to rent, 4 x 8 or larger, for about three weeks, 12" or larger wheels. 626/355-1209.

VANPOOL RIDERS, from Victor Valley/Hesperia. 4-1424, Scott.

For Rent

ALHAMBRA, roommate wanted for 2 bd., 1 ba. apt., fully furnished, washer/dryer to share, must be okay w/2 indoor cats, non-smoker, permit parking, approx. 7 mi. from Caltech, \$425 + util. 626/293-8497.

ALTADENA, house on cul de sac, 2 bd., 2 ba., 3129 Raymond Ave. 626/798-3640.

ALTADENA "sabbatical house," 3 bd. + study, boundary Angeles Nat'l Forest, 3 mi. from JPL (trails to Lab behind house), view, hardwood floors, fireplace, antiques, completely furn.: dinnerware, utensils, pots/pans, linens, fine soaps, necessities included, just bring toothbrush & clothes, TV/DVD/VHS, Dish satellite, wireless DSL, garden, fruit trees, BBQ, parking, private, immaculate, available for short terms. 626/798-3235, info/visit.

ARCADIA apts., 2 bd. + lg. den, 1 ba., garage, remodeled kitchen, stove, dishwasher, clean, spacious, walking distance to shops, exc. neighborhood, no pets, water/gardener/trash incl., \$1,350 +util. & sec. dep. 626/576-7333 or [cpl@caltech.edu](mailto:cpl@caltech.edu).

ARCADIA house, 3 bd., 2 ba., hardwood floors, recently remodeled kitchen w/new appliances, formal living/dining rm., fireplace, fenced backyard w/fruit trees, great location, Arcadia schools, \$2,000 + sec. dep. 626/445-3975, Rula.

GLENDALE, room in lovely home, quiet neighborhood, private bath, cable, use of kitchen, washer/dryer, no pets or smoking, \$600, incl. util. 545-0455.

LA CAÑADA with view, 2 bd., 1 ba., large private patio, new appliances, berber carpets, incredible city lights, 2 min. walk to JPL/Foothill/Shuttle, \$1,395. 957-1009, A.J.

LA CRESCENTA house, above Fthl. blvd., 7 mi. from JPL, 3 bd., 2 ba., lg. living room w/fireplace, lg. dining rm., big kitchen, huge fenced yard, patio, \$2,300. 957-8332.

PASADENA, charming, 2 bd., 1 ba., rear home for lease in Bungalow Heaven Historic Landmark District, 3 mi. from JPL, central heat and a/c, wood floors, wood blinds, stove, refrigerator, disposal, washer, dryer, gardener provided, private fenced yard, dog considered, avail. Sept.1, \$1,500 + \$1,500 dep. 626/798-6865, Nancy.

PASADENA/SIERRA MADRE border, condo, 1 bd., 1 ba., 1 parking place, 1015 N. Michillinda, 13 min. to JPL, walk to shops, \$1,100. 626/799-2909.

SANTA CLARITA, American Beauty Village, light and bright townhome, impeccable unit, approximately 1,000 sq. ft., 2 bd., 2 ba., Pergo floors, tile throughout, fireplace in living room, dining area, breakfast bar, all appliances included, 2-car tandem attached garage, community pool, spa, tennis court, view, \$1,750 + \$1,500 deposit. 805/390-3733.

SAN MARINO house, 3 bd., 2 ba., 2-car garage w/auto, opener, newly painted, remodeled kitchen, dishwasher, a/c, laundry hookups, fireplace, spacious family rm. overlooking yard, no pets, exc. neighborhood & school district, \$3,200 + util. & sec. dep. 626/576-7333 or [cpl@caltech.edu](mailto:cpl@caltech.edu).

SUNLAND, large 1 + 1, newly remodeled, walk-in closet, 6-unit bldg., entry floor tile, new carpet, hall cabinets, air, parking, laundry, dining area + bar, \$795. 248-7610.

SUNLAND, extra large, 2 + 2, newly remodeled, 4 huge closets, hall cabinets, patio, new carpet/oven/dishwasher, 4-unit bldg., quiet, laundry, entry floor tile, \$1,295. 248-7610.

TUJUNGA, Crystal View area, small, 1 bd. guesthouse on secure/private 3/4 acre, 15 min. from JPL, storage, W/D, rose garden, patio, fruit trees, car port, \$875, util. incl. 952-7980, Ann.

VAN NUYS, 2 bd., 2 ba., den/fam rm. as bd., pool, 2.5 gar, lg rms., close to fmys, shopping, parks and trans., \$2,500 + security deposit. 786-2289, A.J.

Real Estate

ALISO VIEJO, Orange County, gorgeous, modern, 4 bd., house, ready to move in, built in 2000, great neighborhood, walk to Town Center/shops/schools, only 7 mi. from beach, asking \$699,000/obo. 949/916-6635.

Vacation Rentals

ARROWHEAD cabin, sleeps 8, all knotty pine, \$180/wkends., \$425/wk., sec. dep. required. 952-6221, Mon-Thur.: 909/337-1036, Fri-Sun.

BIG BEAR LAKEFRONT luxury townhome, 2 decks, tennis, indoor pool/spa, beautiful master bd. suite, slps. 6. 949/786-6548.

CAMBRIA house, ocean front, exceptional white water view, accom. up to 4 people, all amenities provided. 702/256-1359 & [ereynolds2@cox.net](mailto:ereynolds2@cox.net).

FLORIDA condo on the surf of New Smyrna Beach, beautifully furnished, 2 bd., 2 ba., full kitchen, only 30 min. to Cape Canaveral and 90 min. to Walt Disney World, quiet, relaxing, overlooking beach, barbeque, pool, game rm., great Atlantic Ocean view, easy walk to stores and restaurants, sleeps 6, avail. weekly or monthly. 760/439-7821, Darlene or [dfhaug@yahoo.com](mailto:dfhaug@yahoo.com).

GREEN VALLEY LAKE, cabin, sleeps 6, near Big Bear, furnished, cable TV, fully equipped kit., fenced deck, BBQ, pets okay, trout fishing, swimming, hiking, \$100/nt. 949/859-2237 or 323/258-4464.

HAWAII, Maui condo, NW coast, ocean front view, 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microwave, d/w, pool, priv. lanai, slps. 4, laundry fac., low season rate \$115/nite/2, high season rate \$130/ nite/2, \$15/nite/add'l person. 949/348-8047 or [jackandrandy@cox.net](mailto:jackandrandy@cox.net).

LAS VEGAS timeshare, 5-star resort, 7 nights, 1 bd., sleeps 4, must be 21 to register, Oct. 8-15, dates and location (Palm Springs, Tahoe, Utah, Dana Point, Ramona) can be changed, need not be full week. 626/447-4734.

MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, slps. 6-8, fully equip'd kitchen incl. microwave, D/W, cable TV, VCR, phone, balcony w/view to mtns., Jacz., sauna, streams, fishponds, close to Mammoth Creek, JPL disc'nt. 626/798-9222 or 626/794-0455 or [valeriee@caltech.edu](mailto:valeriee@caltech.edu).

OCEANSIDE on the sand, charming 1 bd. condo, panoramic view, walk to pier or harbor, pool, spa, game rm., sleeps 4. 949/786-6548.

RESORTS, five-star Hyatt and Marriott, includes Carmel, Tahoe, Sedona, Colorado Rockies, Florida and Puerto Rico, luxurious residential-style studios with furnished kitchenette, starting at \$480 for 7 nights, Palm Springs, Orlando, Puerto Vallarta specials, studio with full kitchen, \$399 for 7 nights, 1 and 2 bds., w/full kitchens, partial weeks also avail. 626/794-9579 or [fivestarresorts@earthlink.net](mailto:fivestarresorts@earthlink.net).

ROSARITO BEACH condo, 2 bd., 2 ba., ocean view, pool, tennis, short walk to beach on priv. rd., 18-hole golf course 6 mi. away, priv. secure parking. 626/794-3906.

TIMESHARE, world-wide locations, see directory at [www.IntervalWorld.com](http://www.IntervalWorld.com), \$850 for 7 nights, 2 bd., 2 ba., accommodate up to 6 adults, 4 or 5-star resorts, need 2-month advance planning. 323/257-5703, or [Edward1@gmail.com](mailto:Edward1@gmail.com)